Name: _____

Final Exam Study Guide
Algebra 1A 2015

*We will be completing this study guide in parts. If you know how to complete all problems on this Study Guide, you will do very well on the Final Exam.
*If you choose to skip a night of studying and practice, you probably will not do as well as you would like!

Part I: Classifying Numbers, Measures of Central Tendency and Algebraic Properties

Due: Friday 5/22/15

Describe each number as completely as possible using all terms that apply. Choose from: irrrational, rational, integer, whole, and natural.
a) -5 R, I
b) 0.25 R
c) pi Irrational
d) 0 R, I, W, N
e) 109 R, I, W, N
f) $\sqrt{2}$ Irrational

Algebraic Properties: Please write the CAPITAL LETTER of the property represented by each statement.

A. Associative Property **B. Commutative Property** **C. Distributive Property**

D. Identity Property of Addition **E. Identity Property of Multiplication**

F. Inverse Property of Addition **G. Inverse Property of Multiplication**

a. $8(1) = 8$ E

b. $8 + (7 + 9) = 8 + (9 + 7)$ A

c. $8 + (-8) = 0$ F

d. $8(\frac{1}{8}) = 1$ G

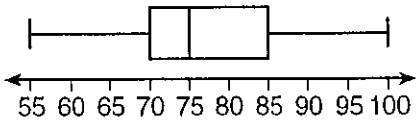
e. $8(7 - 9) = 8(7) - 8(9)$ C

f. $8 + 0 = 8$ D

g. $8 + (7 + 9) = (8 + 7) + 9$ B

Given the Box-and-Whisker Plot and the Stem-and-Leaf Plot, answer the following questions. (10 points)

The box-and-whisker plot below gives the number of texts messages sent by 10 different students in three days



What is the maximum score?

100

What score represents the third quartile?

85

A score of 55 on the plot refers to

a) the third quartile

b) the minimum score

c) the median

d) the mean

What statement is ***not*** true about the plot shown above?

a) 75 represents the mean score

b) 85 represents the 3rd quartile

c) 100 represents the maximum score

d) 55 represents the minimum score

The stem and leaf plot below gives the history test scores of Mr. Hagerty's final last year.

Stem	Leaf
6	1 1 4 6 7 8
7	2 3 5 7 9
8	1 3 5 6 6 7 7 8 9
9	0 0 3 4 6 8 9 9
10	0 0

What was the worst score?	How many students took the test?
61	30
How many students scored 87?	What is the highest score?
2	100
Find the range of the data.	What required part of a stem-and-leaf plot is this one missing? Add this part in.
$100-61=39$	Key $6\|1=61$

Measures of Central Tendency Word Problem: Complete problems #1 and #2. (Note: you will have CHOICE on the Final Exam.)

Problem #1: Billy Bob scored the following on his first four math tests: 83, 87, 92, and 89. What is the minimum score Billy Bob needs on his fifth test in order to have a mean of 90? **Write and solve an equation to solve this problem.** Do you think Billy Bob can achieve this goal? Explain.	**Problem #2:** In her first four years of professional softball, Lena Leroy hit 40, 42, 50, and 25 home runs. What is the minimum number of homeruns Lena will need in her fifth year in order to have a mean of 45 homeruns per year? **Write and solve an equation to solve this problem.** Do you think Lena can achieve this goal? Explain.
$\frac{83+87+92+89+x}{5}=90$ $351+x=450$ $-351 \quad -351$ $x=99$ yes	$\frac{40+42+50+25+x}{5}=45$ $157+x=225$ $-157 \quad -157$ $x=68$ NO

Part II: Expressions and Equations

Due: Tuesday 5/26/15

Simplifying: Please simplify each expression completely. BOX your final answers.

a) -9(-x + 7)

$\boxed{9x - 63}$

c) x + y + 1 + x + 2 + y + 1

$\boxed{2x + 2y + 4}$

b) -4(h - 2) + 6(2h + 6)

$-4h + 8 + 12h + 36$

$\boxed{8h + 44}$

d) (2r - 7)4

$\boxed{8r - 28}$

Using complete sentences and algebraic terms, please explain how expressions and equations are alike and how they are different. (Give at least one similarity and one difference.)

expressions	equations
• no equal sign	• equal sign
• can be simplified	• can be solved

Using complete sentences and algebraic terms, please explain how an equation can have a solution of ALL REAL NUMBERS. Use an example for support.

When you get equivalent expressions when solving an equation. It is also called identity. An example is $2a + 4 = 2a + 4$

Solve the following equations. Show ALL of your work and BOX your final answers.

a) $-8 + x = 3$

$+8 \quad +8$

$\boxed{x = 11}$

b) $5b = -20$

$\boxed{b = -4}$

c) $\frac{9}{10}h = -45$

$9h = -450$

$\boxed{h = -50}$

e) $-7(2h - 1) = 21$

$-14h + 7 = 21$

$-14h = 14$

$\boxed{h = -1}$

e) $-6(y + 1) - 2y = 4(-2y + 1) - 10$

$-6y - 6 - 2y = -8y + 4 - 10$

$-4y - 6 = -8y - 6$

$-4y = -8y$

$0 = 4y$ $\boxed{y = 0}$

9. WITHOUT ACTUALLY SOLVING, please explain how you would solve the equation: $-5x + 6 = 36$. Use complete sentences and algebraic terms. Please be sure to JUSTIFY each step.

Part III: Word Problems, Probability, Ratios/Proportions
Due: Tuesday 5/26/15

Word Problem: Define variables and write an equation to model each situation. (4 points)

The total length of the edges of a cube is 10 times the length of an edge.

T = total length
e = # of edges

$T = 10e$

The total cost of lunch is $7.50 times the number of people at the table.

T = total cost
n = # of people

$T = 7.5n$

Solve each proportion. BOX your final answer.

$\frac{9}{6} = \frac{x}{10}$

$6x = 90$

$\boxed{x = 15}$

$\frac{4}{m-8} = \frac{8}{2}$

$8 = 8m - 64$

$+64 \quad +64$

$72 = 8m$

$\frac{72}{8} = \frac{8m}{8}$

$\boxed{9 = m}$

$\frac{7}{9} = \frac{b}{b-10}$

$9b = 7b - 70$

$-7b \quad -7b$

$\frac{2b}{2} = \frac{-70}{2}$

$\boxed{b = -35}$

$\frac{x-3}{x} = \frac{9}{10}$

$10x - 30 = 9x$

$\frac{-30}{-1} = \frac{1x}{-1}$

$\boxed{30 = x}$

Proportion and Scaled Maps. Solve each problem to find the missing side length. BOX your final answer.

The ratio of the weight of Meg's cat to the weight of Anne's cat is 5:7. Meg's cat weighs 20 kg. How much more does Anne's cat weigh?

$\frac{5}{7} = \frac{20}{x}$

$5x = 140$

$\boxed{x = 28 \text{ kg}}$

The scale of a map is 1 inch : 20 miles. What is the actual distance between two towns that are 3.5 inches apart?

$\frac{1 \text{ in}}{20 \text{ m}} = \frac{3.5}{x}$ $\boxed{70 \text{ miles}}$

Independent and Dependent Events. Suppose you choose two numbers from a box containing ten cards with the numbers 1-10. State whether the two events are independent or dependent. Then find each probability.

P(6 then an even number) without replacing the card

$\frac{1}{10} \cdot \frac{4}{9} = \boxed{\frac{4}{90}}$ dependent

P(1 and an odd number) with replacing the card

$\frac{1}{10} \cdot \frac{1}{2} = \boxed{\frac{1}{20}}$ independent

P(an even number then an odd number) without replacing the card

$\frac{1}{2} \cdot \frac{5}{9} = \boxed{\frac{5}{18}}$ dependent

P(an even number and an odd number) with replacing the card

$\frac{1}{2} \cdot \frac{1}{2} = \boxed{\frac{1}{4}}$ independent

Define:
Population large group
Sample random smaller selection from the population
Bias Any variable that will skew the data

Situation: A vegetable garden has 100 tomato plants arranged in a 10-by-10 array. The gardener wants to know the average number of tomatoes on the plants.
Because counting the number of tomatoes on all the plants is too time-consuming, the gardener decides to choose 10 plants at random to find the average number of tomatoes on his plants.

What is the population?

100 tomato plants

What is the sample?

10 plants chosen at random

Which of the three scenarios would be considered a biased sample? WHY?

A. A random sample of students at a middle school shows that 10 students prefer listening to rock, 15 students prefer listening to hip-hop, and 25 students no must while they exercise. It is concluded that half the students prefer no music while exercising.

B. Every tenth person who walks into a department store is surveyed to determine his or her music preference. Out of 150 customers, 70 stated they prefer rock music. The manager concludes that about half the customers prefer rock music.

C. The customers of a music store are surveyed to determine their favorite leisure time activity. The results show that 85% of people like to listen to music in their leisure time.

The scenario is biased because the people leaving the music store are more likely to pick listening to

Part IV: Word Problems
(DRT, Linear Relationship, Percent Change)
Due: Wednesday 5/27/14

Linear Relationship: Ms. Scheld wanted to order some custom T-shirts that say "**ALGEBRA IS LIFE**" on them. She got two sales quotes from two different companies.

- MONSTER T-shirt Company charges $12 per shirt.
- CRAZY T-shirt Company charges a flat fee of $10 for the design, and then $8 per shirt.

PART A

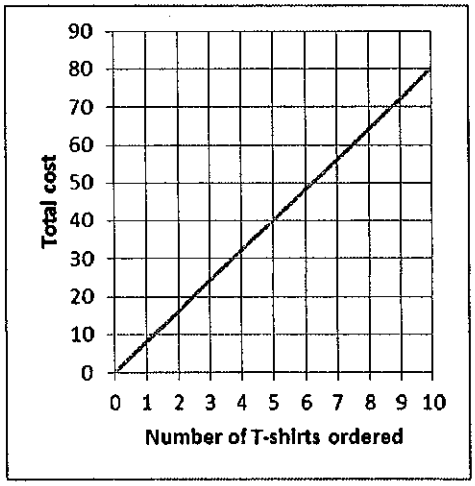
Write a linear function to model the relationship between the total cost and the number of shirts ordered for each company.

Equation for MONSTER	Equation for CRAZY
$T = 12S$	$T = 8S + 10$

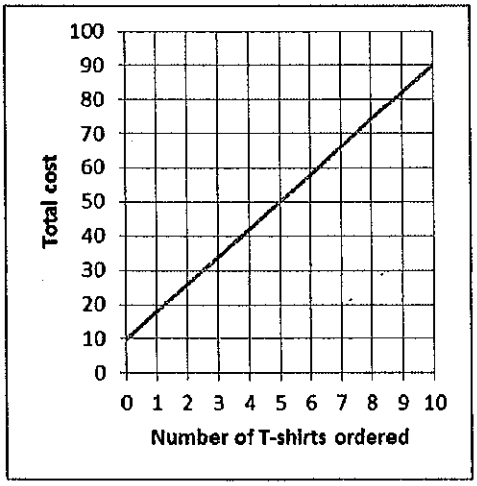
PART B. Which of the following graphs below corresponds to MONSTER? D

PART C. Which of the following graphs corresponds to CRAZY? B

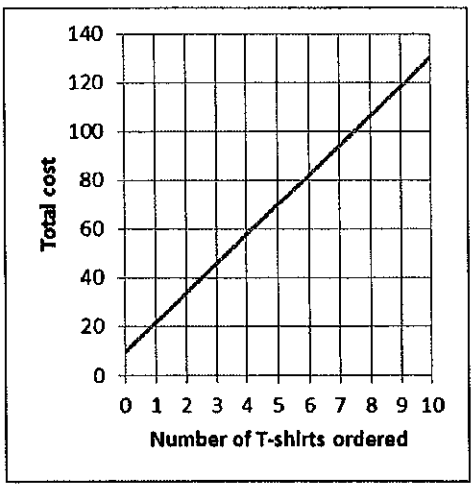
A



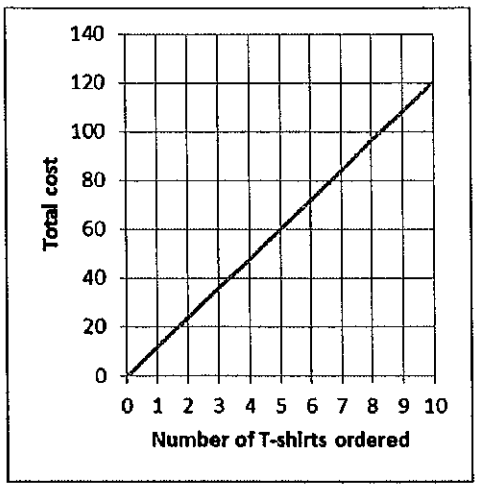
B



C



D



DRT: (Note: On the Final Exam, you will have a choice.)

Problem #1: Elise left for the day, but she forgot her cell phone. She is riding in a car that is driving an average of 45 mph. Anthony, seeing her cell phone, hops on his motorcycle an hour later to bring her the cell phone. If he is driving at an average of 55 mph, after how many hours will he catch up to Elise?

a. What type of DRT problem is this? catch up

b. What is the general equation for this type of problem? $d_1 = d_2$

c. Define your variable. let t = Elise's time

d. Fill in the DRT chart.

	r	t	D
Elise	45	t	$45t$
Anthony	55	$t-1$	$55t-55$

d. Write and solve an equation.

$45t = 55t - 55$

$-55t \quad -55t$

$-10t = -55$

$\frac{-10t}{-10} = \frac{-55}{-10}$

$t = 5.5$ hours

e. ANSWER the question.

4.5 hours

Problem #2: Megan and Jorge are both at school, preparing to leave for summer vacation. Megan leaves at 3 pm, traveling north at a speed of 60 mph, to her cabin in Maine. Jorge leaves at 4 pm, traveling south at a speed of 50 mph, to his beach house in Florida. At what time will Megan and Jorge be 600 miles apart?

a. What type of DRT problem is this? opposite directions

b. What is the general equation for this type of problem? $d_1 + d_2 = TD$

c. Define your variable. Let t = Megan's time

d. Fill in the DRT chart.

	r	t	D
Megan	60	t	60t
Jorge	50	t - 1	50t - 50

d. Write and solve an equation.

$$60t + 50t - 50 = 600$$

$$\frac{110t}{110} = \frac{650}{110}$$

$$t = 6 \text{ hours}$$

e. ANSWER the question.

9 pm

Percent Change: Please answer each question related to percent change.

a) What is the formula used to find percent change?

$$\frac{\text{new} - \text{original}}{\text{original}} \times 100\%$$

b) A sweater originally priced at $88 is reduced to $34 at the beginning of spring. What is the percent decrease? Round to the nearest hundredth.

$$\frac{88-34}{88} \times 100\% = 61\% \text{ decrease}$$

c) When WLPCS first began, there were 179 students. Now, there are 640 students. What is the percent increase? Round to the nearest hundredth.

$$\frac{179-640}{179} \times 100\% = 258\% \text{ increase}$$

Part V: Relations, Functions, Slope and Linear Equations
Due: Thursday 5/28/14

Comparing: In complete sentences, please define relation and function and describe the relationship between the two.

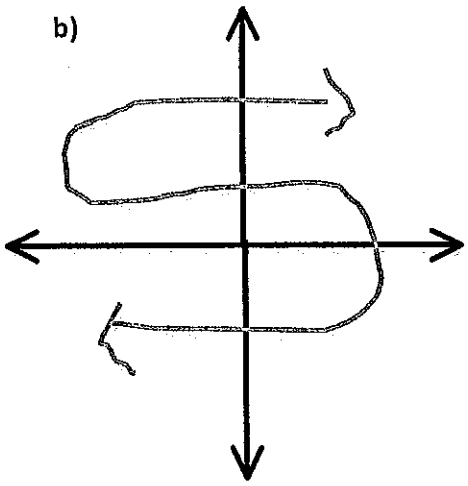
17. Function? Are the following relations functions? Explain your answer using complete sentences and algebraic terms.

a)

x	y
-2	2
1	0
-2	3
-1	4

NO

b)



NO

Function Notation: Given $f(x) = -x^2 - 8$, find $f(-1)$.

$f(-1) = -(-1)^2 - 8$

$f(-1) = -1 - 8$

$\boxed{f(-1) = -9}$

Slope: Find the slope of the line between the two points. Write your answers as reduced fractions, if possible.

a) (-3, 8) and (-1, 2)

$\frac{2-8}{-1-(-3)} = \frac{-6}{2} = \boxed{-3}$

b) (4, -6) and (12, -6)

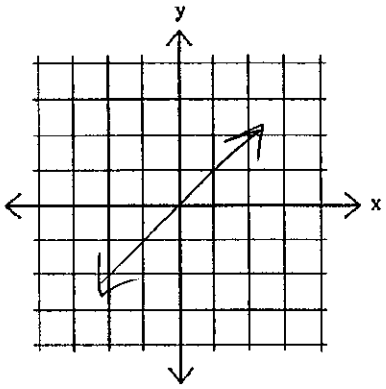
$\frac{-6-(-6)}{12-4} = \frac{0}{8} = \boxed{0}$

c) (9, -2) and (9, 1)

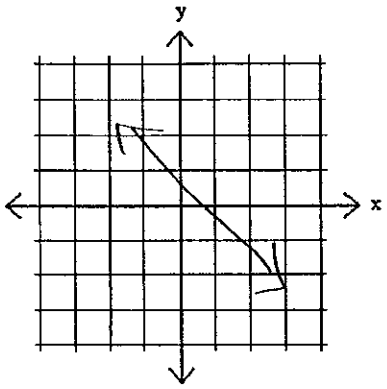
$\frac{1-(-2)}{9-9} = \frac{1}{0}$ $\boxed{\text{undefined}}$

Draw an example of a line with a positive slope, a negative slope, a slope of zero, and an undefined slope. (4 points)

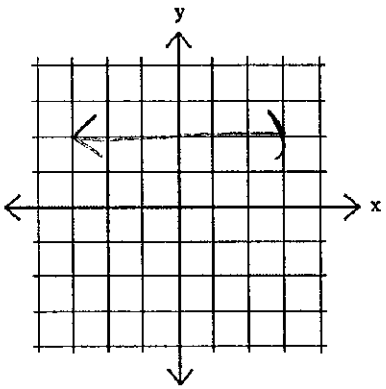
positive slope



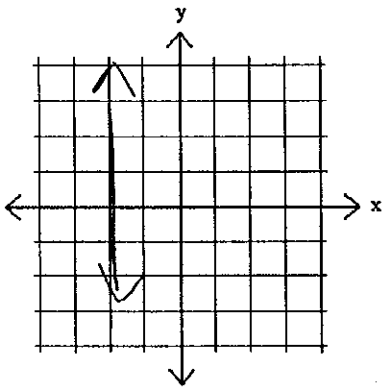
negative slope



slope of zero



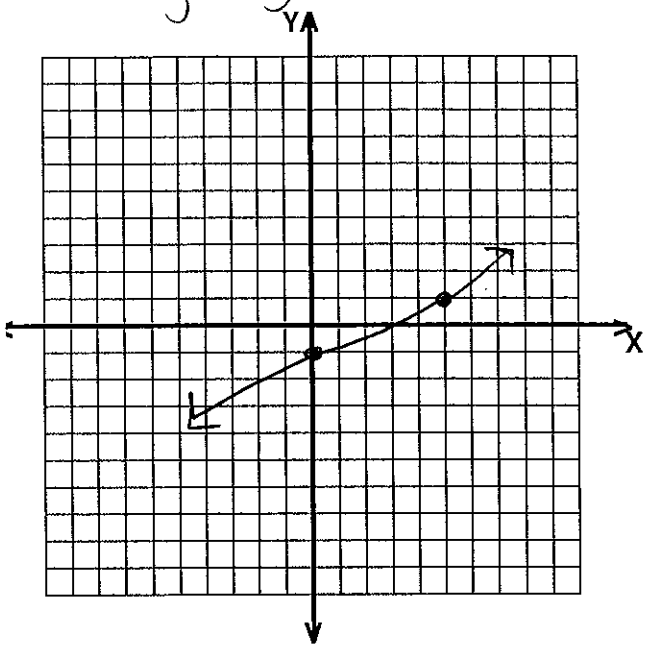
undefined slope



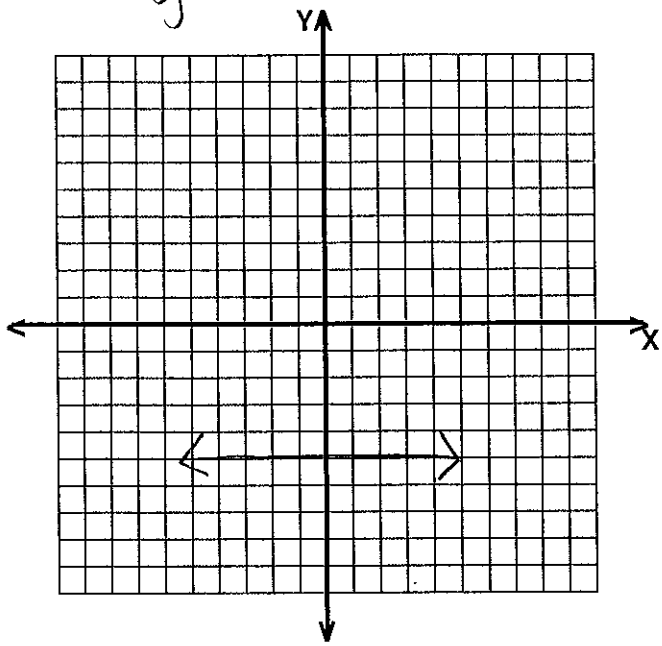
Graphing Linear Equations: Please graph the linear equations on the coordinate planes provided. NAME YOUR LINES.

$y = \frac{2}{5}x - 1$ $y = -5$ $3x - y = -9$ $x = 1$

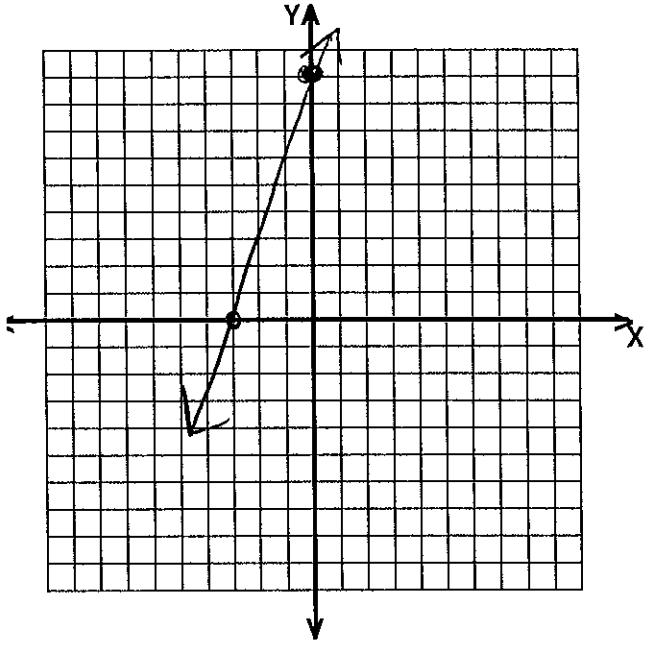
$y = \frac{4}{5}x - 1$



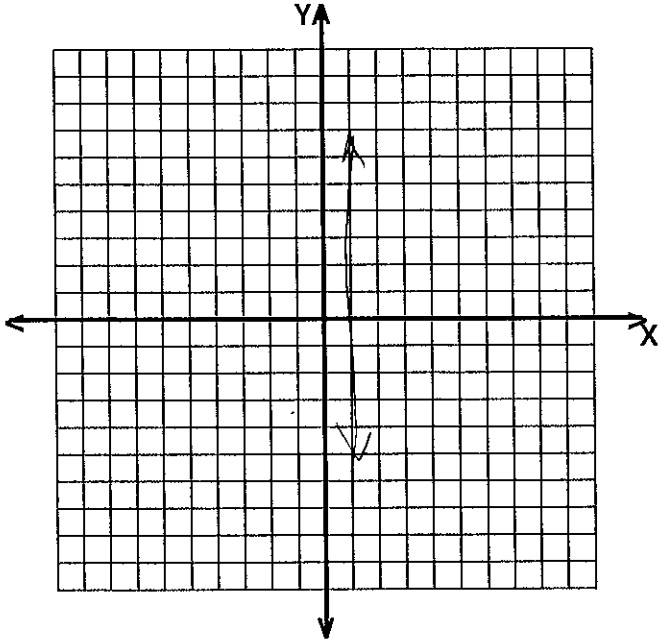
$y = -5$



$3x - y = -9$



$x = 1$



Writing Equations: Write an equation in the requested form using the given information.

a) Write the equation for the line in slope-intercept form that passes through (2, -1) and (4, -5).

$\frac{-5-(-1)}{4-2} = \frac{4}{2} = 2$

$y = 2x + b$

$-5 = 2(4) + b$

$-5 = 8 + b$

$-8 \quad -8$

$-13 = b$

$\boxed{y = 2x - 13}$

b) Write an equation for the line in slope-intercept form that passes through (-8, 1) and is parallel to the line: $y = -\frac{1}{4}x + 2$.

$1 = -\frac{1}{4}(-8) + b$

$1 = 2 + b$

$-2 \quad -2$

$-1 = b$

$\boxed{y = -\frac{1}{4}x - 1}$

c) Write an equation for the line in slope-intercept form that passes through (2,-3) and is perpendicular to the line: $x - 2y = -9$.

$\frac{-2y}{-2} = \frac{-x}{-2} - \frac{9}{2}$

$y = \frac{1}{2}x + \frac{9}{2}$

$y = -2x + b$

$-3 = 2(2) + b$

$-4 \quad -4$

$1 = b$

$\boxed{y = -2x + 1}$

d) Write the equation of the line in STANDARD form whose equation in slope-intercept form is $y = \frac{1}{4}x - 2$.

$4y = x - 8$

$-x + 4y = -8$

$\boxed{x - 4y = 8}$

Part VI: Pythagorean Theorem, Square roots, DV and IV, and Standard Form
Due: Friday 5/29/14

Pythagorean Theorem: Use the PT and/or its converse to answer each question.

a) Write the Pythagorean Theorem.

$$a^2+b^2=c^2$$

b) Three sides of a triangle are 25 feet, 65 feet and 60 feet. Is this a right triangle? Show your work.

a c b

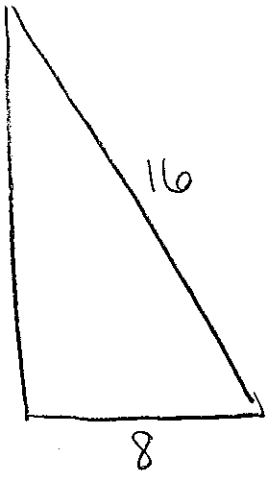
$25^2 + 60^2 = 65^2$

$625 + 3600 = 4225$

$4225 = 4225$

yes

c) Jack leans a ladder 8 feet from the base of the beanstalk in order to climb it. The ladder is 16 feet long. How high on the beanstalk will the ladder reach? **Draw a diagram and use the PT to solve. Round to the nearest tenth, if necessary.**



$a^2 + 8^2 = 16^2$

$a^2 + 64 = 256$

$-64 \quad -64$

$a^2 = 192$

$a \approx 13.9$ ft

Square Roots: Use a calculator to find the square root. Round your answer to the nearest hundredth.

$\sqrt{36}$ 6	$-\sqrt{576}$ −24
$\sqrt{\frac{25}{49}}$ $\frac{5}{7}$	$\sqrt{x+2x}$ when x = 12 $\sqrt{12+24} = 6$

Direct and Inverse Variation: Determine whether the table is direct or inverse variation. Then write the equation for each table.

x	y
3.5	2
1	7
-1	-7

direct variation **OR** inverse variation

equation: $y = \frac{7}{x}$

x	y
15	3
30	6
5	1

direct variation **OR** inverse variation

equation: $y = \frac{1}{5}x$

y varies directly with x. If y = -4 when x = 2, find y when x – 9.

x	y	$k = y/x$
2	-4	-2
-9	18	-2

18

y varies inversely with x. If y = 40 when x = 8, find x when y = 10.

x	y	$k = xy$
8	40	320
32	10	

32

28. Identify the slope and y-intercept. (2 points)	**Identify the x-and-y intercepts. (2 points)**
y = 5x – 6 m = 5 b = −6	2x – 5y = 40 x–intercept: 20 y-intercept: −8